CLAIMS

1. Camshaft adjuster (1, 1') for adjusting and fixing a position of an angle of rotation of a camshaft (8) relative to a crankshaft of a reciprocating-piston internal-combustion engine, comprising a high transmission and friction-reduced adjusting gear mechanism (2) comprising a drive shaft rotationally fixed to the crankshaft, a driven shaft rotationally fixed to the camshaft (8), and an adjusting shaft (9) connected to an adjusting motor shaft (10) of an adjusting motor, the adjusting gear mechanism (2) and the adjusting motor (3) are formed as separate units and are connected to each other by a rotational backlash-free, disengaging coupling (4, 4', 4"; 32, 32'; 46; 51).

2. Camshaft adjuster according to Claim 1, wherein the adjusting motor is an electric adjusting motor (3).

3. Camshaft adjuster according to Claim 2, wherein the coupling (4, 4', 4"; 32, 32'; 46, 51) has two parts, which can be joined together and of which one is rotationally fixed to the adjusting motor shaft (10) and the other is rotationally fixed to the adjusting shaft (9).

4. Camshaft adjuster according to Claim 3, wherein one of the two parts is formed as the outer part (19, 19'; 33, 33') and the other is formed as the inner part (18, 18'; 34, 34'), wherein the two parts can be inserted one into the other in a rotational backlash-free way.

5. Camshaft adjuster according to Claim 4, wherein the coupling is formed as a profiled shaft coupling which has two coupling surfaces (21, 21') on the outer part (19, 19') and two coupling surfaces (20, 20') on the inner part (18, 18'), wherein rotational backlash-reducing means are provided on the inner part.

6. Camshaft adjuster according to Claim 5, wherein a minimal, tightly toleranced play is provided as the rotational backlash-reducing means between the coupling surfaces (20, 21) of the inner and outer parts (18, 19).

7. Camshaft adjuster according to Claim 5, wherein biased metal or plastic springs, which bridge the play between the coupling surfaces (20', 21'), are provided as the rotational backlash-reducing means.

8. Camshaft adjuster according to Claim 7, wherein the springs are metal and are formed as flat bending or plate springs (23).

9. Camshaft adjuster according to Claim 8, wherein the flat bending or plate springs (23) are formed as one-piece spring clasps (25), which engage at corners (26) of the inner part (18').

10. Camshaft adjuster according to Claim 4, wherein the coupling is formed as a tubular shaft coupling (32, 32') comprising a hollow cylindrical outer part (33, 33') and a coaxial, cylindrical inner part (34, 34'), which is arranged with play in the outer part (33, 33') and which preferably has the rotational backlash-reducing means.

11. Camshaft adjuster according to Claim 10, wherein an elastically deformable, metal tolerance ring (44) is provided as the rotational backlash-reducing means, which is arranged in a radial groove (45) on a periphery of the coaxial, cylindrical inner part (34') and projects beyond the groove by a certain extent in a radial direction.

12. Camshaft adjuster according to Claim 10, wherein at least one locking ball (37) or one cylindrical locking pin (41) with a conical end (42) is provided as the rotational backlash-reducing means, which are guided in radial or through bore holes (35, 39) of the coaxial, cylindrical inner part (34) with play and which can be moved into other radial bore holes (38, 38') of smaller diameter, which are aligned with the through bore holes, in the hollow cylindrical outer part (33) under the force of a compression or through spring (36, 36'; 40, 40') by an extent limited by a smaller diameter.

13. Camshaft adjuster according to Claim 12, wherein the other radial bore holes (38, 38') are formed as elongated holes aligned in an axial direction.

14. Camshaft adjuster according to Claim 3, wherein the coupling is formed as a clutch coupling (46), whose two parts have axial claws (47, 48), which are arranged at the same diameter and which engage in each other, wherein between the claws (47, 48) there are spaces, which are bridged in a rotational backlash-free way by tooth elements (50) of an elastic, biased polymer collar (49).

15. Camshaft adjuster according to Claim 4, wherein the coupling is formed as a profiled shaft coupling comprising a toothed shaft coupling, whose outer or inner part (55, 65) includes internal or external gearing (56, 63), that is formed from elastic plastic.

16. Camshaft adjuster according to Claim 15, wherein the plastic external gearing (56, 63) is preferably molded directly on corresponding parts of the toothed shaft coupling or on a correspondingly formed, metallic intermediate bushing (58) and the intermediate bushing (58) is connected to the toothed shaft coupling preferably by a force-fit connection.

17. Camshaft adjuster according to Claim 3, wherein the coupling is formed as a magnetic shaft coupling (51), whose two parts have opposing permanent magnets (52, 53), which transfer a driving moment of the adjusting motor (3) through magnetic forces in a contact-less and rotational backlash-free way from the adjusting motor shaft (10') to the adjusting shaft (9).

18. Camshaft adjuster according to Claim 17, wherein the permanent magnets (52, 53) are arranged in an axial direction and that between the magnets there is a non-magnetic membrane (54) with two-sided play, which seals the adjusting motor (3) in an oil-tight manner.

19. Camshaft adjuster according to Claim 2, wherein the coupling has two parts which can be joined together, one of the parts is formed integrally with the adjusting shaft and the other of the parts is formed integrally with the adjusting motor shaft.

20. Camshaft adjuster of Claim 7, wherein the springs are plastic and are formed as a polymer band (28) or as a polymer O-ring (29) and are preferably arranged in grooves (22) or a circular groove (30, 31) of the coupling surfaces (20') of the inner part (18').